CLAIMS

1. A method for indicating a deviation in an analyzable material according to a wavelength, characterized in that in the method: the light produced by the light source is dispersed as several spectrums to the surface of the analyzable moving planar material; the spectrums reflected from the surface of the analyzable moving planar material are collected; the collected spectrums are guided into a spectrum camera; the spectrums guided into the spectrum camera are compared to a predetermined reference spectrum; and the location of one or more deviations in the analyzable material is defined on the basis of comparison.

2. A method according to claim 1, characterized in that in the method: the light produced by the light source is dispersed to the surface of the analyzable material as overlapping spectrums in a first and a second direction such that the first and the second direction are essentially perpendicular to one another; the spectrums reflected from the surface of the analyzable material are collected with a lens to the focal point of the lens; and the spectrums collected to the focal point are guided by at least one optic fibre into a spectrum camera.

3. A method according to claim 2, characterized in that in the method: the light produced by the light source is dispersed to the surface of the analyzable material as overlapping spectrums in a first and a second direction such that the spectrums dispersed in the first and the second direction are formed of different wavelength areas.

4. A method according to claim 1, characterized in that in the method: the light produced by the light source is dispersed by the first lens as a spectrum to the surface of the analyzable material; the spectrum reflected from the analyzable

material is collected with the second lens in a line that comprises the wavelengths reflected to the surface of the analyzable material; the collected line is guided to a bank of optic fibres, in which each fibre collects a portion of the reflected light; each fibre is guided as a spatial pixel of the spectrum camera; and each spatial pixel is dispersed into a group of spectral components.

5. A method according to claim 2, characterized in that the method uses a set of measurement modules, each one of which contains the necessary optic components, wherein in the method: the light produced by the light source is guided by the first connection into each measurement module; the light produced by the light source is dispersed to the surface of the analyzable material as overlapping spectrums in a first and a second direction such that using the light dispersed through each measurement module a particular portion of the area to be analyzed is covered; the spectrums reflected from the surface of the analyzable material are collected with the lens of each measurement module to the focal point of the lens; and the spectrums collected to the focal point are guided into a spectrum camera by at least one optic fibre.

6. A method according to claim 4, characterized in that the method uses a set of measurement modules, each one of which contains its own second connection containing a bank of optic fibres, a first lens and a second lens, wherein in the method: the light produced by the light source is guided by the first connection into each measurement module; the light produced by the light source is dispersed by the first lens as a spectrum to the surface of the analyzable material such that using the light dispersed through the first lens of each measurement module a particular portion of the area to be analyzed

is covered; the spectrum reflected from the surface of the analyzable material is collected with the second lens in a line that comprises the wavelengths reflected to the area surface of the analyzable material covered by each measurement module; the collected line is guided to the bank of optic fibres of the second connection of each measurement module, in which each fibre collects a portion of the reflected light; each fibre of each measurement module is guided as a spatial pixel of the spectrum camera; and each spatial pixel is dispersed into a group of spectral components.

7. A method according to claim 5 or 6, characterized in that the method further comprises a step of: moving the measurement bar, to which is attached a set of measurement modules.

8. A method according to any of the preceding claims, characterized in that the analyzable material is wood, paper, fabric, metal or plastic.

9. A method according to any of the preceding claims, characterized in that the method further comprises the steps of: analyzing the data gathered by the spectrum camera; and defining the location of a deviation in the analyzed material on the basis of spatial and spectral components of the pixel of the spectrum camera.

10. A method according to any of the preceding claims, characterized in that measurement is calibrated according to the light source such that: the reference point of the analyzable material is lit directly without dispersing the light produced by the light source as at least one spectrum; a reference spectrum is collected from the light reflected from the surface of the reference point of the analyzable material; and a spectral distribution of the light source is defined from the reference spectrum.

11. A method according to any of the preceding claims, c h a r a c t e r i z e d in that measurement is calibrated according to the light source such that: the light produced by the light source is dispersed as several spectrums to the surface of the reference point of the analyzable material; a reference spectrum is collected from the light reflected from the surface of the reference point of the analyzable material; and a spectral distribution of the light source is defined from the reference spectrum.

12. A method according to claim 7 or 8, c h a r a c t e r i z e d in that the reference spectrum is averaged and/or median filtered on the basis of new spectral measurements.

13. A method according to any of the preceding claims, c h a r a c t e r i z e d in that the first lens comprises at least one prism and/or grating.

14. A method according to any of the preceding claims, c h a r a c t e r i z e d in that the second lens comprises a cylinder lens.

15. A system for indicating a deviation in an analyzable material according to a wavelength, c h a r a c t e r i z e d in that the system comprises: an analyzable moving planar material (102); at least one light source (10); at least one spectrum camera (16); means (110) for dispersing the light produced by the light source (10) as several spectrums to the surface of the analyzable moving planar material (102); means (108) for collecting the spectrums reflected from the surface of the analyzable moving planar material; means (112, 14) for guiding the collected spectrums into the spectrum camera (16); means (106) for comparing the spectrums guided into the spectrum camera to a predetermined reference spectrum; and means (106) for defining the location of one or more deviations in the analyzable material on the basis of comparison.

16. A system according to claim 14, c h a r - a c t e r i z e d in that the system comprises: means (234, 236) for dispersing the light produced by the light source (10) to the surface of the analyzable material (102) as overlapping spectrums in a first and a second direction such that the first and the second direction are essentially perpendicular to one another; means (238) for collecting the spectrums reflected from the surface of the analyzable material (102) to the focal point; and at least one optic fibre (226) for guiding the spectrums collected to the focal point into a spectrum camera (16).

17. A system according to claim 16, c h a r - a c t e r i z e d in that means (234, 236) are arranged to disperse the light produced by the light source (10) to the surface of the analyzable material (102) as overlapping spectrums in a first and a second direction such that the spectrums dispersed in the first and the second direction are formed of different wavelength areas.

18. A system according to claim 15, c h a r - a c t e r i z e d in that the system comprises: at least one first lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102); at least one second lens (108), with which the spectrum reflected from the analyzable material is collected in a line that comprises the wavelengths reflected to the surface of the analyzable material (102); at least one bank of optic fibres (112), in which each fibre collects a portion of the reflected light; and at least one spectrum camera (16) which is arranged to receive each fibre as a spatial pixel, and which is arranged to disperse each spatial pixel into a group of spectral components.

19. A system according to claim 16, c h a r - a c t e r i z e d in that the system comprises a set of

measurement modules, and that: each measurement module comprises a first connection (240, 244), with which the light produced by the light source (10) is guided into each measurement module; each measurement module comprises means (234, 236) for dispersing the light produced by the light source to the surface of the analyzable material (102) as overlapping spectrums in a first and a second direction such that using the light dispersed through each measurement module a particular portion of the area to be analyzed is covered; each measurement module comprises means (238) for collecting the spectrums reflected from the surface of the analyzable material to the focal point of the lens contained in each measurement module; and each measurement module comprises a second connection (242), to which is connected at least one optic fibre (26) which is arranged to connect the measurement module to the spectrum camera (16) for guiding the spectrums collected to the focal point into the spectrum camera (16).

20. A system according to claim 15, c h a r a c t e r i z e d in that the system comprises a set of measurement modules (18), and that: each measurement module (18) comprises a first connection (114) which is arranged to receive and/or relay the light produced by the light source (10) which is relayed via optic fibre (12); each measurement module (18) comprises a first lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102) such that using the light dispersed through the first lens (110) of each measurement module (18) a particular portion of the area to be analyzed is covered; each measurement module (18) comprises a second lens (108), with which the spectrum reflected from the analyzable material (102) is collected in a line that comprises the wavelengths reflected to the area surface of the ana-

lyzable material (102) covered by each measurement module (18); each measurement module (18) comprises a second connection (112) containing a bank of optic fibres, in which each fibre is arranged to collect a portion of the reflected light; to the second connection (112) is connected an optic fibre (14) which is arranged to connect the bank of optic fibres to a spectrum camera (16); the spectrum camera (16) is arranged to set each fibre of each measurement module (18) as a spatial pixel; and the spectrum camera (16) is arranged to disperse each spatial pixel into a group of spectral components.

21. A system according to any of the preceding claims, characterized in that the measurement module (18) comprises the first orientation means, with which the first lens (110) is oriented to disperse the light produced by the light source (10) as a spectrum to the desired area surface of the analyzable material (102).

22. A system according to any of the preceding claims, characterized in that the measurement module (18) comprises the second orientation means, with which the second lens (110) is oriented to collect the spectrum reflected from the analyzable material (102) from the desired area of the material (102).

23. A system according to any of the preceding claims, characterized in that the system further comprises a measurement bar (100), to which the measurement modules (18) are attached.

24. A system according to any of the preceding claims, characterized in that the system further comprises means for moving the measurement bar (100).

25. A system according to any of the preceding claims, characterized in that the ana-

lyzable material (102) is wood, paper, fabric, metal or plastic.

26. A system according to any of the preceding claims, c h a r a c t e r i z e d in that the data processing device (106) is arranged to analyze the data gathered by the spectrum camera (16) and define the location of a deviation in the analyzed material (102) on the basis of the spatial and spectral components of the pixel of the spectral camera (16).

27. A system according to any of the preceding claims, c h a r a c t e r i z e d in that the system further comprises means for locating dispersion means (110) to the side such that the analyzable material is lit directly for measurement of a reference spectrum from the reference point of the analyzable material.

28. A system according to any of the preceding claims, c h a r a c t e r i z e d in that the first lens (110) comprises at least one prism and/or grating.

29. A system according to any of the preceding claims, c h a r a c t e r i z e d in that the second lens (108) comprises a cylinder lens.

30. A measurement bar for analyzing the material, c h a r a c t e r i z e d in that the measurement bar (100) comprises at least one measurement module (18); each measurement module comprises means (110, 234, 236) for dispersing the light produced by the light source (10) as several spectrums to the surface of the analyzable moving planar material (102); each measurement module (18) comprises means (108, 238) for collecting the spectrums reflected from the surface of the analyzable moving planar material (102); and each measurement module (18) comprises means (112, 14, 226, 242) for guiding the collected spectrums into the spectrum camera (16).

31. A measurement bar according to claim 30, c h a r a c t e r i z e d in that each measurement module (18) comprises: a first connection (240, 244), with which the light produced by the light source (10) is guided into each measurement module; means (234, 236) for dispersing the light produced by the light source to the surface of the analyzable material (102) as overlapping spectrums in a first and a second direction such that using the light dispersed through each measurement module a particular portion of the area to be analyzed is covered; means (238) for collecting the spectrums reflected from the surface of the analyzable material to the focal point of the lens contained in each measurement module; and a second connection (242), to which is connected at least one optic fibre (26) which is arranged to connect the measurement module to the spectrum camera (16) for guiding the spectrums collected to the focal point into the spectrum camera (16).

32. A measurement bar according to claim 30, c h a r a c t e r i z e d in that each measurement module (18) comprises: at least one first lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102); at least one second lens (108), with which the spectrum reflected from the analyzable material is collected in a line that comprises the wavelengths reflected to the surface of the analyzable material (102); and at least one bank of optic fibres (112), in which each fibre is arranged to collect a portion of the reflected light.

33. A measurement bar according to claim 30, c h a r a c t e r i z e d in that each measurement module (18) comprises a first connection (114) which is arranged to receive and/or relay the light produced by the light source (10) which is relayed via optic fibre (12); each measurement module (18) comprises a first

lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102) such that using the light dispersed through the first lens (110) of each measurement module (18) a particular portion of the area to be analyzed is covered; each measurement module (18) comprises a second lens (108), with which the spectrum reflected from the analyzable material (102) is collected in a line that comprises the wavelengths reflected to the area surface of the analyzable material (102) covered by each measurement module (18); each measurement module (18) comprises a second connection (112) containing a bank of optic fibres, in which each fibre is arranged to collect a portion of the reflected light; and to the second connection (112) is connected an optic fibre (14) which is arranged to connect the bank of optic fibres to a spectrum camera (16).

34. A measurement bar according any of the preceding claims, c h a r a c t e r i z e d in that the measurement bar (100) is arranged to be moveable.

35. A measurement bar according any of the preceding claims, c h a r a c t e r i z e d in that the measurement bar (100) is arranged above the analyzable material.

36. A measurement bar according any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises means for locating dispersion means (110) to the side such that the analyzable material is lit directly for measurement of a reference spectrum from the reference point of the analyzable material.

37. A measurement bar according any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises the first orientation means, with which the first lens (110) is oriented to disperse the light produced by the light

source (10) as a spectrum to the desired area surface of the analyzable material (102).

38. A measurement bar according to any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises the second orientation means, with which the second lens (110) is oriented to collect the spectrum reflected from the analyzable material (102) from the desired area of the material (102).

39. A measurement bar according any of the preceding claims, c h a r a c t e r i z e d in that the first lens (110) comprises at least one prism and/or grating.

40. A measurement bar according to any of the preceding claims, c h a r a c t e r i z e d in that the second lens (108) comprises a cylinder lens.

41. A measurement module for analyzing the material, c h a r a c t e r i z e d in that the measurement module (18) comprises: means (110, 234, 236) for dispersing the light produced by the light source (10) as several spectrums to the surface of the analyzable moving planar material (102); means (108, 238) for collecting the spectrums reflected from the surface of the analyzable moving planar material (102); and means (112, 14, 226, 242) for guiding the collected spectrums into the spectrum camera (16).

42. A measurement module according to claim 41, c h a r a c t e r i z e d in that the measurement module (18) comprises: a first connection (240, 244), with which the light produced by the light source (10) is guided into each measurement module; means (234, 236) for dispersing the light produced by the light source to the surface of the analyzable material (102) as overlapping spectrums in a first and a second direction such that using the light dispersed through each measurement module a particular portion of the area to be analyzed is covered; means (238) for col-

lecting the spectrums reflected from the surface of the analyzable material to the focal point of the lens contained in each measurement module; and a second connection (242), to which is connected at least one optic fibre (26) which is arranged to connect the measurement module to the spectrum camera (16) for guiding the spectrums collected to the focal point into the spectrum camera (16).

43. A measurement module according to claim 41, characterized in that the measurement module (18) comprises: a first lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102); a second lens (108), with which the spectrum reflected from the analyzable material is collected in a line that comprises the wavelengths reflected to the surface of the analyzable material (102); and a bank of optic fibres (112), in which each fibre is arranged to collect a portion of the reflected light.

44. A measurement module according to claim 41, characterized in that the measurement module (18) comprises: a first connection (114) which is arranged to receive and/or relay the light produced by the light source (10) which is relayed via optic fibre (12); a first lens (110), with which the light produced by the light source (10) is dispersed as a spectrum to the surface of the analyzable material (102) such that using the light dispersed through the first lens (110) a particular portion of the area to be analyzed is covered; a second lens (108), with which the spectrum reflected from the analyzable material (102) is collected in a line that comprises the wavelengths reflected to the area surface of the analyzable material (102) covered by the measurement module (18); a second connection (112) containing a bank of optic fibres, in which each fibre is arranged to

collect a portion of the reflected light; and to the second connection (112) is connected an optic fibre (14) which is arranged to connect the bank of optic fibres to a spectrum camera (16).

45. A measurement module according to any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises means for locating dispersion means (110) to the side such that the analyzable material is lit directly for measurement of a reference spectrum from the reference point of the analyzable material.

46. A measurement module according to any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises first orientation means, with which the first lens (110) is oriented to disperse the light produced by the light source (10) as a spectrum to the desired area surface of the analyzable material (102).

47. A measurement module according to any of the preceding claims, c h a r a c t e r i z e d in that the measurement module (18) comprises the second orientation means, with which the second lens (110) is oriented to collect the spectrum reflected from the analyzable material (102) from the desired area of the material (102).

48. A measurement module according to any of the preceding claims, c h a r a c t e r i z e d in that the first lens (110) comprises at least one prism and/or grating.

49. A measurement module according to any of the preceding claims, c h a r a c t e r i z e d in that the second lens (108) comprises a cylinder lens.